

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 16 MAR 2005
WIPO PCT

Applicant's or agent's file reference MELO 1 PCT	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI 2003/000964	International filing date (day/month/year) 16.12.2003	Priority date (day/month/year) 16.12.2002
International Patent Classification (IPC) or national classification and IPC D06M 16/00		
Applicant MELOCOTON OY et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 10 sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- | | |
|---|---|
| <input checked="" type="checkbox"/> Box No. I | Basis of the report |
| <input type="checkbox"/> Box No. II | Priority |
| <input type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> Box No. VI | Certain documents cited |
| <input type="checkbox"/> Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> Box No. VIII | Certain observations on the international application |

Date of submission of the demand 16.07.2004	Date of completion of this report 04.03.2005
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2003/000964

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

☐ the international application as originally filed/furnished

☒ the description:

pages 1-3, 5-28 as originally filed/furnished

pages* 4, 28-35 received by this Authority on 07.12.2004

pages* _____ received by this Authority on _____

☒ the claims:

pages 38-39 as originally filed/furnished

pages* _____ as amended (together with any statement) under Article 19

pages* 36 received by this Authority on 07.12.2004

pages* _____ received by this Authority on _____

☐ the drawings:

pages _____ as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (*specify*): _____

☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (*specify*): _____

☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2003/000964

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-19</u>	YES
	Claims	_____	NO
Inventive step (IS)	Claims	<u>1-19</u>	YES
	Claims	_____	NO
Industrial applicability (IA)	Claims	<u>1-19</u>	YES
	Claims	_____	NO

2. Citations and explanations (Rule 70.7)

Document cited in the International Search Report:

D1: The 10th International Wool Textile Research Conference, Nov. 2000, Aachen, A. Miettinen-Oinonen et al: "Modification of Wool Properties with Proteases", pages EN-P6 1-10

Document D1, which is considered to represent the most relevant state of the art, discloses modification of wool properties with proteases in order to improve properties such as shrinkage resistance during wet processing from which the subject-matter of claim 1-19 differs in that the process is in industrial scale and that the textile is moved as little as possible or not at all.

The subject-matter of claim 1-19 is therefore novel and is considered to involve an inventive step (Article 33(2) PCT).

nology have generally been implemented on a laboratory scale only, whereas the present invention is implemented on an industrial scale.

It has been observed that, in water wash, the woollen textiles, which were treated with the present invention, shrank 3% or less from the original. It was further observed that the textiles retained their properties for at least five or as many as 20 successive washings.

The finish according to the present invention can be carried out on dyed or undyed woollen textiles. According to a preferred embodiment of the invention, the woollen textile is first subjected to enzyme treatment and then to dyeing. It has been observed that extremely good dyeing results are obtained in this way. The colours have been found to be brighter and deeper, when dyeing is carried out after the enzyme treatment.

Woollen textiles are mainly made by using the combed or the worsted wool yarns methods. In the combed method, long-stapled wool is used, from which lightweight or medium-heavy woven and knitted fabrics are made. Examples of combed articles include suiting, trousering and light knitted fabrics. Woollen textiles can be dyed as tops, yarn, fabric or ready-made articles.

For the worsted wool yarns, short-staple wool is used, from which heavy weight woven and knitted fabrics are made. Examples of products made by using the worsted wool yarns include upholstery fabrics, thick knitted fabrics, felts, flannels and tweeds. These woollen textiles are dyed as fibre, yarn, fabric or finished articles.

"The finish of woollen textiles" refers to any procedure that can be used to remove the rough feeling of the woollen textile and to make the surface of the wool look smooth, not pilling. The woollen textiles can be finished by means of either wet or dry finishing. In yarn dyed fabrics, mere steaming may be enough; generally, however, the woollen textiles are washed and stentered (wet fixing) after weaving. In this connection, the finish of woollen textiles refers to wet finishing, which can also include dyeing treatment.

The term "woollen textile" in connection with this invention refers to wool fibre or wool fibre-containing tops, yarn, knitted or woven fabric containing at least 30%, preferably at least 50%, most preferably at least 70% of wool fibre. The wool fibre refers to fibre containing 100% wool. The wool tops or bay-yarn, in turn, can be pure wool, or the wool fibre may have been woven into or mixed with a synthetic fibre, such as polyacryl or polyester. The wool fibre may also have been woven into or mixed with some other protein-containing fibre, such as silk, or with some other

TABLE 4

Conditions of the protease treatment:

- 1) Trial sample size 1716 g
 2) Liquor ratio 1:30
 3) Temperature 50°C
 4) pH 9
 5) Time 30 min
 6) Mechanics 2

Biotechnical finishing method for wool

Tests: 1 to 21

Material: 100% woollen cloth, worsted yarn
 1x1 plain weave, 190 g/m²,
 off-white

Appearance and touch	
No of sample	Appearance and touch
1	0
2	0
3	0
4	+
5	+
6	++++
7	++++
8	+
9	+
10	++
11	++
12	+
13	+
14	++
15	++
16	+
17	+
18	++
19	++
20	+
21	0

Biotechnical finishing method for wool

TABLE 5

Test numbers: 30 to 39

Material: E, 100% wool, worsted wool yarn, plain knitted fabric, colour 1 lilac, 375 g/m2

Conditions of the protease treatment:

1) Trial sample size: 600 g
 2) Liquor ratio: 1:30
 3) Temperature: 50°C
 Temperature in tumble-drying: 50°C
 Residual moisture after tumble-drying: 10 to 30%

1st Dimensional change

3= dimensional change in the direction of the warp in protease treatments (%)

4= dimensional change in the direction of the weft in protease treatments (%)

2nd Dimensional change

5= dimensional change in the direction of the warp in water washes (%)

6= dimensional change in the direction of the weft in water washes (%)

Dimensional change

No of sample	Dose ml/g	pH	Min.	Mech.	3	4	5	6
30	-	-	-	-	-	-	-	-
32	0.0125	7	30	0	3.3	-3.0	5.1	-4.2
33	0.25	9.5	15	0	5.5	1.0	1.0	-1.0
34	0.125	9.5	15	0	4.0	-2.0	-1.0	0.2
35*)	0.025	9.5	30	2	11.7	0.7	0.9	0.1
36	0.0125	7	30	1	9.3	-3.1	-4.5	0.7
37*)	0.0125	7	30	2	17.8	6.2	-0.2	0.7
38	0.0125	9.5	30	1	8.4	-2.2	-4.6	0.4
39*)	0.0125	9.5	30	2	16.6	3.1	-0.2	-0.3
							-4.2	-0.4

*) Felted in protease treatments

07-12-2004

30

TABLE 6

Biotechnical finishing method for wool

Test numbers: 30 to 38

Material: E, 100% wool, worsted wool yarn, plain knitted fabric, colour 1 lilac, 375 g/m²

Conditions of the protease treatment:

- 1) Trial sample size: 600 g
 2) Liquor ratio: 1:30
 3) Temperature: 50°C
 Temperature in tumble-drying: 50°C
 Residual moisture after tumble-drying: 10 to 30%

Abrasion resistance and pilling

No of sample	Dose ml/g	pH	Min.	Mech.	7			8		9	
					Pilling			Abrasion resistance, rotations		Abrasion resistance, % of the original	
					125	500	2000				
30	-	-	-	-	3.0	2.0	1.5	56 000		0.0	
32	0.0125	7	30	0	4.5	3.0	3.0	49 000		11.6	
33	0.25	9.9	15	0	4.0	3.0	2.0	42 500		24.1	
34	0.125	9.5	15	0	3.5	3.0	2.0	47 000		16.1	
36	0.0125	7	30	1	4.5	3.5	3.0	48 100		14.1	
38	0.0125	9.5	30	1	4.3	3.6	3.1	48 000		14.3	

TABLE 7

Biotechnical finishing method for wool

Test numbers: 30 to 39

Material: E, 100% wool, worsted wool yarn, plain knitted fabric, colour 1 lilac, 375 g/m²

Conditions of the protease treatment:

- 1) Trial sample size: 600 g
 2) Liquor ratio: 1:30
 3) Temperature: 50°C
 Temperature in tumble-drying: 50°C
 Residual moisture after tumble-drying: 10 to 30%

Appearance and touch

No of sample	Appearance and touch
30	-
32	+++++
33	+
34	+
35	---
36	++
37	---
38	+++
39	---

TABLE 8.

Biotechnical finishing method for wool

Test numbers: 40 to 52, 58 to 61

Material: G, 100% wool, worsted wool yarn, plain knitted fabric, colour 2 petroleum, 375 g/m²

Conditions of the protease treatment:

1) Trial sample size: 600 g

2) Liquor ratio: 1:30

3) Temperature: 50°C

Temperature in tumble-drying: 50°C

Residual moisture after tumble-drying: 10 to 30%

1st Dimensional change

3= dimensional change in the direction of the warp in protease treatments (%)

4= dimensional change in the direction of the weft in protease treatments (%)

2nd Dimensional change

5= dimensional change in the direction of the warp in water washes (%)

6= dimensional change in the direction of the weft in water washes (%)

Dimensional change

No of sample	Dose ml/g	pH.	Min.	Mech.	3		4		5		6	
					Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
40	0.0125	7	15	0	-2.1	1.7	-2.1	1.7	-2.1	1.7	-2.1	1.2
41	0.0125	7	15	1	6.8	-1.6	6.8	-1.6	-0.8	0.9	-0.8	0.9
42	0.125	7	15	0	5.4	1.5	5.4	1.5	-1.0	-0.6	-1.0	-0.6
43	0.125	7	15	1	6.3	0.5	6.3	0.5	2.9	-1.6	2.9	-1.6
44	0	7	15	0	4.9	2.5	4.9	2.5	3.8	0.0	3.8	0.0
45	0	7	15	1	7.0	-2.2	7.0	-2.2	3.6	0.6	3.6	0.6
46	0	7	30	0	4.6	2.0	4.6	2.0	3.0	-3.6	3.0	-3.6
47	0.0125	7	30	1	7.9	-0.2	7.9	-0.2	2.2	-0.1	2.2	-0.1
48	0.125	7	30	0	2.8	0.2	2.8	0.2	-0.2	0.3	-0.2	0.3
49	0.125	7	30	1	8.3	1.5	8.3	1.5	1.6	-1.1	1.6	-1.1
50	0.0125	7	30	0	3.9	2.9	3.9	2.9	1.2	-0.2	1.2	-0.2
51	0	7	30	1	7.1	2.2	7.1	2.2	3.2	-3.0	3.2	-3.0
52	-	-	-	-	-	-	-	-	4.1	3.1	4.1	3.1
58	0.0125	9.5	30	0	-0.8	5.3	-0.8	5.3	0.0	1.1	0.0	1.1
59	0.0125	9.5	30	1	1.3	6.8	1.3	6.8	1.3	2.1	1.3	2.1
60	0.125	9.5	30	0	3.7	-0.9	3.7	-0.9	-1.0	2.5	-1.0	2.5
61	0.125	9.5	30	1	4.2	1.8	4.2	1.8	1.7	-0.1	1.7	-0.1

TABLE 9

Biotechnical finishing method for wool

Test numbers: 40 to 52, 58 to 61

Material: G, 100% wool, worsted wool yarn, plain knitted fabric, colour 2 petroleum, 375 g/m²

Conditions of the protease treatment:

1) Trial sample size: 600 g

2) Liquor ratio: 1:30

3) Temperature: 50°C

Temperature in tumble-drying: 50°C

Residual moisture after tumble-drying: 10 to 30%

Abrasion resistance and pilling

No of sample	Dose ml/g	pH	Min.	Mech.	7			8		9	
								Pilling		Abrasion resistance, rotations	
						125	500	2000			
40	0.0125	7	15	0		4.0	3.0	2.0	52 900		5.5
41	0.0125	7	15	1		4.5	3.5	3.0	50 900		9.1
42	0.125	7	15	0		5.0	4.0	3.5	48 150		14.0
43	0.125	7	15	1		4.5	3.0	3.0	46 000		17.9
44	0	7	15	0		4.0	3.0	2.5	51 600		7.9
45	0	7	15	1		4.5	3.5	2.5	52 050		7.1
46	0	7	30	0		4.0	2.5	2.0	52 150		6.9
47	0.0125	7	30	1		4.5	3.5	3.0	48 900		12.7
48	0.125	7	30	0		4.5	3.5	3.0	48 100		14.1
49	0.125	7	30	1		4.0	3.0	3.0	44 050		21.3
50	0.0125	7	30	0		4.0	3.0	3.0	51 500		8.0
51	0	7	30	1		3.0	2.0	1.5	55 500		0.9
52	-	-	-	-		3.0	2.0	1.0	56 000		0.0
58	0.0125	9.5	30	0		4.5	3.5	3.0	50 000		10.7
59	0.0125	9.5	30	1		4.5	3.5	3.0	49 000		12.5
60	0.125	9.5	30	0		4.0	3.0	2.5	47 000		16.1
61	0.125	9.5	30	1		4.0	3.5	2.5	44 800		20.0

Biotechnical finishing method for wool

TABLE 10

Test numbers: 40 to 52, 58 to 61

Material: G, 100% wool, worsted wool yarn, plain knitted fabric, colour 2 petroleum, 375 g/m²

Conditions of the protease treatment:

1) Trial sample size:

2) Liquor ratio:

3) Temperature:

Temperature in tumble-drying:

Residual moisture after tumble-drying

Appearance and touch

No of sample	Appearance and touch
40	+
41	+
42	++
43	+
44	-
45	-
46	-
47	+++
48	++
49	+
50	++++
51	-
52	-
58	+++++
59	+++
60	++
61	+

TABLE 11

Biotechnical finishing method for wool

Test numbers: 62 to 70, 77 to 81

Material: H, 100% knitted woollen fabric, worsted wool yarn, 1x1 ribbing, 430 g/m²

Conditions of the protease treatment:

1) Trial sample size: 600 g

2) Liquor ratio: 1:30

3) Temperature: 50°C

Temperature in tumble-drying: 50°C

Residual moisture after tumble-drying: 10 to 30%

1st Dimensional change

3= dimensional change in the direction of the warp in protease treatments (%)

4= dimensional change in the direction of the weft in protease treatments (%)

2nd Dimensional change

5= dimensional change in the direction of the warp in water washes (%)

6= dimensional change in the direction of the weft in water washes (%)

Dimensional change

No of sample	Dose ml/g	pH	Min.	3			4		5		6	
				Enzyme mech.	Dyeing mech.		Warp	Weft	Warp	Weft	Warp	Weft
62	0	7	15	0	0		0.9	4.0	3.7	-2.9		
63	0	7	15	1	1		4.7	4.0	3.8	4.2		
64	0.0125	9.5	30	1	1		3.8	6.6	1.0	-0.2		
65	0.0125	9.5	30	1	1		6	5.7	0.1	-0.7		
66	0	9.5	30	1	1		7.8	6.0	4.5	-3.6		
67	0.0125	9.5	30	1	1		6.3	5.3	0.0	-0.3		
68	0.0125	9.5	30	1	1		6.6	6.0	1.1	-0.9		
69	0.0125	9.5	30	1	1		7.2	4.7	1.4	-0.3		
70	0.0125	9.5	30	1	1		6.3	6.5	1.6	-0.7		
77	0.0125	9.5	30	1	1		6.5	3.4	1.3	-1.0		
78	0.0125	9.5	30	0	1		4.2	4.8	1.7	-0.4		
79	0.125	9.5	30	0	1		4.2	3.1	0.9	-0.6		
80	0.25	9.5	30	0	1		2.9	4.5	0.6	0.0		
81	0.0125	9.5	30	1	1		4.4	3.9	1.3	0.5		

CLAIMS:

1. An industrial process for treating woollen textiles, **characterized** in that it comprises the following steps:
 - 5 - bringing a knitted or woven woollen textile in an aqueous solution into contact with a protease enzyme in a large amount of water so as to move the woollen textile as little as possible by adjusting the mechanics to 4 to 10 rpm at a temperature of about 60°C or less for 10 to 90 min,
 - 10 - inactivating the enzyme by raising the temperature to over about 60°C or reducing the pH to between 4 and 5,
 - making the woollen textile dry in mechanical drying at a temperature of about 60°C or less to a residual moisture content of 10 to 45%, and
 - carrying out final drying without mechanics.
2. An industrial process for treating woollen textiles, **characterized** in that it comprises the following steps:
 - 15 - bringing a knitted or woven woollen textile in an aqueous solution into contact with a protease enzyme in a large amount of water so as to move the woollen textile as little as possible by adjusting the mechanics to 4 to 10 rpm at a temperature of about 60°C or less for 10 to 90 min,
 - 20 - taking the woollen textile to dyeing conditions and dyeing the textile,
 - making the woollen textile dry in mechanical drying at a temperature of about 60°C or less to a residual moisture content of 10 to 45%, and
 - carrying out final drying without mechanics.
3. The method according to claim 1 or 2, **characterized** in that the protease treatment is carried out under neutral or alkaline conditions, preferably at a pH of between 6 and 11.
4. The method according to any of the preceding claims, **characterized** in that the protease is serine protease.
5. The method according to any of the preceding claims, **characterized** in that, during the protease treatment, the mechanics is adjusted to 4 to 6 rpm.